

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions of claims in the application.

1. (Currently amended): A reduction device of an industrial robot comprising:
~~characterized in a reduction device of an industrial robot having~~

a robot base installed in an XY plane of XYZ orthogonal coordinates;[[,]]

a rotating barrel portion rotatably attached to the robot base;[[, and]]

a lower arm of which one end is axially supported by the rotating barrel portion via a front/rear shaft, pivoting back and forth to the robot base around the front/rear shaft;

a large gear fixed to the robot base, and

a small gear meshing with the large gear and axially supported in the rotating barrel portion,

wherein the small gear is arranged within an angular range from the rotational center of the large gear, said angular range being ± 35 degrees from an imaginary reference plane, and

wherein said imaginary reference plane is defined as a plane parallel to a lower arm rotational plane, orthogonal to the front/rear shaft, and including a rotational axis of the large gear,
~~which is a reduction device of an industrial robot including at least one stage of a gear train where a large gear fixed to the robot base and a small gear axially supported in the rotating barrel portion are brought in mesh with each other;~~

~~wherein the small gear is arranged by determining an angle of arranging the small gear, centering on a rotating shaft of the large gear within a range in which a circumferential direction backlash amount of the small gear becomes equal to or smaller than that of the large~~

~~gear in a state of being inclined around an axis, which is connecting rotational centers of the large gear and the small gear in the XY plane owing to an operation of rotating the lower arm, in a state of arranging the small gear such that the axis passing the respective rotational center points of the large gear and the small gear in the XY plane is orthogonal to a plane of operating to rotate the lower arm.~~

2. (Currently amended): A reduction device of an industrial robot comprising:
~~characterized in a reduction device of an industrial robot having~~
- a robot base installed ~~arranged~~ in an XY plane of XYZ orthogonal coordinates;[[,]]
 - a rotating barrel portion rotatably attached to the robot base;[[, and]]
 - a lower arm of which ~~one end of which~~ is axially supported by the rotating barrel portion via a front/rear shaft, pivoting back and forth to the robot base around the front/rear shaft;
 - a small gear fixed to the robot base; and
 - a large gear meshing with the small gear and axially supported in the rotating barrel portion,
 - wherein the small gear is arranged within a angular range from the rotational center of the large gear, said angular range being ± 35 degrees from an imaginary reference plane, and
 - wherein said imaginary reference plane is defined as a plane parallel to a lower arm rotational plane, orthogonal to the front/rear shaft, and including a rotational axis of the large gear,
- ~~which is a reduction device of an industrial robot comprising at least one stage of a gear~~

~~train at which a small gear axially supported by the robot base and a large gear fixed in the rotating barrel portion are brought in mesh with each other;~~

~~wherein the small gear is arranged by determining an angle of arranging the small gear centering on a rotating shaft of the large gear within a range in which a circumferential direction backlash amount of the small gear becomes equal to or smaller than a circumferential direction backlash amount when the large gear is inclined around an axis of connecting rotational centers of the large gear and the small gear in the XY plane owing to an operation of rotating the lower arm in a state of arranging the small gear such that the axis passing the respective rotational center points of the large gear and the small gear in the XY plane is orthogonal to a plane of operating to rotate the lower arm.~~

3. (Currently amended): A reduction device of an industrial robot comprising:
~~characterized in a reduction device of an industrial robot having~~
a robot base installed in an XY plane of XYZ orthogonal coordinates;[[,]]
a rotating barrel portion[[;]] rotatably attached to the robot base to rotate around a rotating shaft;
a lower arm of which one end is axially supported by the rotating barrel portion;
an upper arm of which one end is axially supported by other end of the lower arm;
a large gear fixed to the lower arm; and
a small gear meshing with the large gear and axially supported in the rotating barrel portion.

wherein the small gear is arranged within an angular range from the rotational center of the large gear, said angular range being ± 35 degrees from an imaginary reference plane, and

wherein said imaginary reference plane is defined as a plane parallel to a rotating barrel portion rotational plane, orthogonal to the rotating shaft, and including a rotational axis of the large gear, a lower arm one end of which is axially supported by the rotating barrel portion, and an upper arm one end of which is axially supported by other end of the lower arm, which is a reduction device of an industrial robot comprising at least one stage of a gear train at which a large gear fixed to the lower arm and a small gear axially supported in the rotating barrel portion are brought in mesh with each other;

~~wherein the small gear is arranged by determining an angle of arranging the small gear centering on a rotating shaft of the large gear within a range in which a circumferential direction backlash amount of the small gear becomes equal to or smaller than a circumferential direction backlash amount when the large gear is inclined around an axis of connecting rotational centers of the large gear and the small gear in the XY plane owing to an operation of rotating the rotating barrel portion in a state of arranging the small gear such that the axis of passing the respective rotational center points of the large gear and the small gear in the XY plane becomes in parallel with a rotating shaft of the rotating barrel portion.~~

4.-5. Canceled.

Application No.: 10/542,714
Art Unit: 3682

Amendment Under 37 C.F.R. §1.111
Attorney Docket No.: 052826

6. (Previously presented): The reduction device of an industrial robot according to any one of claims 1 through 3, characterized in that a center portion of the large gear includes a communication hole.